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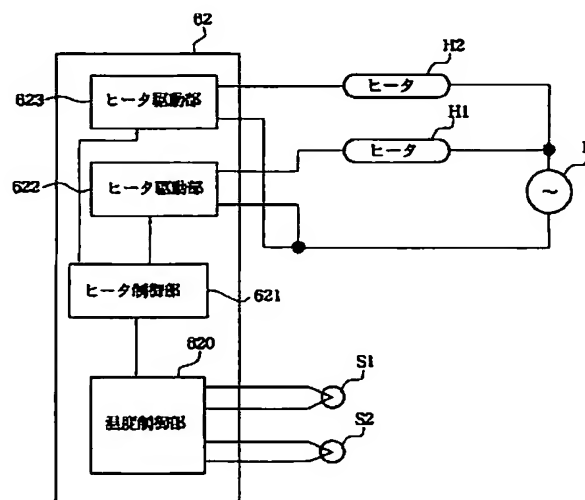
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(54) 【発明の名称】 ヒータ駆動装置

(57) 【要約】

【課題】 ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることが可能である。

【解決手段】 ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、時間T2の間、導通角を90°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B1を実施し、時間T3の間、導通角を180°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B2を実施し、時間T4の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、全波位相制御B1、全波位相制御B2、ゼロクロス駆動制御Cの順に制御する。



## 【特許請求の範囲】

【請求項 1】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間 T 1 の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を 1 波とし 3 波に 1 回駆動する 1/3 波駆動制御とを組み合わせたヒータの 1/3 波位相制御 A を実施し、時間 T 2 の間、導通角を  $90^\circ$  以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御 B 1 を実施し、時間 T 3 の間導通角を  $180^\circ$  未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御 B 2 を実施し、時間 T 4 の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御 C を、前記 1/3 波位相制御 A、全波位相制御 B 1、全波位相制御 B 2、ゼロクロス駆動制御 C の順に制御することを特徴とするヒータ駆動装置。

【請求項 2】前記 1/3 波位相制御 A の位相制御部の導通角は、 $90^\circ$  以下とすることを特徴とする請求項 1 記載のヒータ駆動装置。

【請求項 3】前記全波位相制御 B 1 の時間 T 2 の時間の時間は、1 秒以下とすることを特徴とする請求項 1 または請求項 2 記載のヒータ駆動装置。

【請求項 4】複数のヒータが存在する場合、1/3 波位相制御 A を実施している時間 T 1 と、全波位相制御 B 1 を実施している時間 T 2 と、全波位相制御 B 2 を実施している時間 T 3 の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項 1 乃至請求項 3 のいずれかに記載のヒータ駆動装置。

【請求項 5】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、時間 T 1 の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を 1 波とし 3 波に 1 回駆動する 1/3 波駆動制御とを組み合わせたヒータの 1/3 波位相制御 A を実施し、時間 T 2 の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御 C を、前記 1/3 波位相制御 A、ゼロクロス駆動制御 C の順に制御することを特徴とするヒータ駆動装置。

【請求項 6】前記 1/3 波位相制御 A の位相制御部の導通角は、 $90^\circ$  以下とすることを特徴とする請求項 5 記載のヒータ駆動装置。

【請求項 7】複数のヒータが存在する場合、1/3 波位相制御 A を実施している時間 T 1 の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項 5 または請求項 6 記載のヒータ駆動装置。

【請求項 8】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、所定時間 T 1 の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正

弦波の半波を 1 波とし 3 波に 1 回駆動する 1/3 波駆動制御とを組み合わせたヒータの 1/3 波位相制御 A を実施し、所定時間 T 2 の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御 B を実施し、所定時間 T 3 の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御 C を、前記 1/3 波位相制御 A、全波位相制御 B、ゼロクロス駆動制御 C の順に制御することを特徴とするヒータ駆動装置。

【請求項 9】前記 1/3 波位相制御 A、全波位相制御の位相制御部 B の導通角は、共に  $90^\circ$  以下とすることを特徴とする請求項 8 記載のヒータ駆動装置。

【請求項 10】前記全波位相制御 B の時間 T 2 の時間は、1 秒以下とすることを特徴とする請求項 8 または請求項 9 記載のヒータ駆動装置。

【請求項 11】複数のヒータが存在する場合、前記 1/3 波位相制御 A を実施している時間 T 1 と前記全波位相制御 B を実施している時間 T 2 の間には他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項 8 乃至請求項 9 のいずれかに記載のヒータ駆動装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置に関するものである。

【0002】

【従来の技術】従来、複写機には、ヒートローラ内部に熱源としてヒータを有する定着装置を備えるものがあり、この定着装置のヒータ駆動は、駆動初期は商用電源の正弦波電源電圧がゼロになるゼロクロスポイントで、その周波数周期の半波 2～4 回に 1～3 回ヒータを駆動している。

【0003】

【発明が解決しようとする課題】従来のヒータ駆動は、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするため、突入電流が発生する。突入電流を抑えるために、正弦波電源電圧の導通角に応じてオンオフするヒータ駆動装置がある。このヒータ駆動装置では、突入電流をある程度まで抑えることができるが、正弦波電源電圧の導通角に応じてオンオフするため、ノイズが発生し電波障害や機器の誤動作を招く恐れがある。

【0004】この発明は、かかる実情に鑑みてなされたもので、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることが可能なヒータ駆動装置を提供することを目的としている。

【0005】

【課題を解決するための手段】前記課題を解決し、かつ目的を達成するために、この発明は、以下のように構成した。

【0006】請求項1記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、時間T2の間、導通角を90°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B1を実施し、時間T3の間、導通角を180°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B2を実施し、時間T4の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、全波位相制御B1、全波位相制御B2、ゼロクロス駆動制御Cの順に制御することを特徴とするヒータ駆動装置』である。

【0007】この請求項1記載の発明によれば、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間全波位相制御B1を、時間T3の間全波位相制御B2を、時間T4の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0008】請求項2記載の発明は『前記1/3波位相制御Aの位相制御部の導通角は、90°以下とすることを特徴とする請求項1記載のヒータ駆動装置』である。

【0009】この請求項2記載の発明によれば、ヒータ駆動開始時、時間T1の間、1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0010】請求項3記載の発明は、『前記全波位相制御B1の時間T2の時間の時間は、1秒以下とすることを特徴とする、請求項1または請求項2記載のヒータ駆動装置』である。

【0011】この請求項3記載の発明によれば、全波位相制御B1の時間T2の時間の時間は、1秒以下とすることで、よりノイズの発生を抑え、突入電流を減らすことができる。

【0012】請求項4記載の発明は、『複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と、全波位相制御B1を実施している時間T2と、全波位相制御B2を実施している時間T3の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項1乃至請求項3のいずれかに記載のヒータ駆動装置』である。

【0013】この請求項4記載の発明によれば、複数のヒータが存在する場合、時間T1、時間T2、時間T3の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、か

つ突入電流を抑えることができる。

【0014】請求項5記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、時間T2の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、ゼロクロス駆動制御Cの順に制御することを特徴とするヒータ駆動装置』である。

【0015】この請求項5記載の発明によれば、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0016】請求項6記載の発明は『前記1/3波位相制御Aの位相制御部の導通角は、90°以下とすることを特徴とする請求項5記載のヒータ駆動装置』である。

【0017】この請求項6記載の発明によれば、ヒータ駆動開始時、時間T1の間、1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0018】請求項7記載の発明は、『複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項5または請求項6記載のヒータ駆動装置』である。

【0019】この請求項7記載の発明によれば、複数のヒータが存在する場合、時間T1の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0020】請求項8記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、所定時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、所定時間T2の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Bを実施し、所定時間T3の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、全波位相制御B、ゼロクロス駆動制御Cの順に制御することを特徴とするヒータ駆動装置』である。

【0021】この請求項8記載の発明によれば、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時

間T2の間全波位相制御Bを、時間T3の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0022】請求項9記載の発明は、『前記1/3波位相制御A、全波位相制御の位相制御部Bの導通角は、共に90°以下とすることを特徴とする請求項8記載のヒータ駆動装置』である。

【0023】この請求項9記載の発明によれば、ヒータ駆動開始時、1/3波位相制御A、全波位相制御の位相制御部Bの導通角は、共に90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0024】請求項10記載の発明は、『前記全波位相制御Bの時間T2の時間は、1秒以下とすることを特徴とする請求項8または請求項9記載のヒータ駆動装置』である。

【0025】この請求項10記載の発明によれば、全波位相制御Bの時間T2の時間は、1秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0026】請求項11記載の発明は、『複数のヒータが存在する場合、前記1/3波位相制御Aを実施している時間T1と前記全波位相制御Bを実施している時間T2の間は他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項8乃至請求項9のいずれかに記載のヒータ駆動装置』である。

【0027】この請求項11記載の発明によれば、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と全波位相制御Bを実施している時間T2の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0028】

【発明の実施の形態】以下、この発明のヒータ駆動装置の実施の形態を図面に基づいて説明する。

【0029】図1はヒートローラ内部に熱源としてヒータを有する定着装置を備える機器として複写機の概略構成図である。

【0030】先ず、この複写機の通常のコピー動作について説明する。この複写機は、画像読み取りユニット10、デジタル書き込み系である書き込みユニット20、画像形成部30、給紙部40及び原稿載置部50等より構成される。

【0031】複写機上部には、透明なガラス板などからなる原稿台51と、さらに原稿台51上に載置した原稿Dを覆う原稿カバー52等からなる原稿載置部50があり、原稿台51の下方であって、装置本体内には第1ミラーユニット12、第2ミラーユニット13、撮像レンズ14、CCDアレイなどの撮像素子15等からなる画

像読み取りユニット10が設けられている。

【0032】原稿台51上の原稿Dの画像は、画像読み取りユニット10の照明ランプ12Aと第1ミラー12Bを備える第1ミラーユニット12の実線から破線にて示す位置への平行移動と、第2ミラー13A及び第3ミラー13Bを対向して一体的に備える第2ミラーユニット13の第1ミラーユニット12に対する1/2の速度の追随移動とにより全面を照明走査され、その画像は撮像レンズ14により第1ミラー12B、第2ミラー13A、第3ミラー13Bを経て撮像素子15上へ結像されるようになっている。走査が終わると第1ミラーユニット12及び第2ミラーユニット13は元の位置に戻り、次の画像形成まで待機する。

【0033】撮像素子15によって光電変換されて得られた画像データはデジタル信号に変換された後、画像信号処理部60によって画像処理がなされ、画像信号としてメモリ61に一旦格納される。次いで、画像信号が制御部62の制御によってメモリ61より読み出されパルス幅変調された後書き込みユニット20に入力される。

【0034】画像形成部30は、制御部62の制御によって画像信号が、駆動モータ27、ポリゴンミラー22、fθレンズ23、ミラー24、25、26及び図示しない半導体レーザ、補正レンズ24B等からなる書き込みユニット20に入力されると画像記録動作を開始する。すなわち、像担持体である感光体ドラム31は矢示のように時計方向に回転し、帯電前露光を行って除電する除電は除電器36によって除電された後、帯電器32により電荷を与えられているので、書き込みユニット20によりレーザビームLによって感光体ドラム31上には原稿Dの像に対応した静電潜像が形成される。その後、感光体ドラム31上の前記静電的な潜像は、現像器33のバイアス電圧を印加した現像剤担持体である現像スリーブ33A上に担持する現像剤によって反転現像が行われ可視のトナー像となる。

【0035】一方、給紙部40に装填された給紙カセット41A又は41Bからは指定のサイズの転写紙Pを1枚ずつ搬出ローラ42Aによって搬出し、搬出ローラ43及びガイド部材42を介して画像の転写部に向かって給紙する。給紙された転写紙Pは、感光体ドラム31上のトナー像と同期して作動するレジストローラ44によって感光体ドラム31上へ送出される。この転写紙Pには、転写器34の作用により、感光体ドラム31上のトナー像が転写され、分離器35の除電作用によって感光体ドラム31上から分離されたのち、搬送ベルト45を経て定着装置37へ送られ、定着ローラ100及び加圧ローラ200によって溶融定着された後、排紙ローラ38、46により装置外のトレイ54へ排出される。53は手差し用の給紙台である。

【0036】前記感光体ドラム31はさらに回転を続

け、その表面に転写されずに残留したトナーは、クリーニング装置39において圧接するクリーニングブレード39Aにより除去清掃され、再び除電器36によって除電された後帯電器32により様に電荷の付与を受けて、次の画像形成のプロセスに入る。

【0037】なお、現像器33の攪拌スクリュウ33Cの底部に設けられた透磁率センサTSは現像剤のトナー濃度が変化すると透磁率が変化することを利用して現像器33内の現像剤のトナー濃度を監視し、制御部62に現像剤のトナー濃度情報を送出するセンサである。制御部62は透磁率センサTSの情報によりトナー濃度が一定値以下に減少するとトナー補給の指示をトナー補給ユニットに送出してトナー補給を行うので、現像剤のトナー濃度を常に一定に維持することができる。

【0038】次に、定着装置37を、図2に基づいて説明する。図2は定着装置を示す断面図である。

【0039】定着装置37のケーシング300内には、加圧ローラ200とヒートローラを構成する定着ローラ100とが配置されている。加圧ローラ200は、SU Sの筒体230にシリコンゴム層231が設けられ、筒体230の内部には1本のヒータH1が配置されている。定着ローラ100は、アルミニウムの筒体140に樹脂層141をコーティングして設け、アルミニウムの筒体140の内部には、2本のヒータH2が配置されている。

【0040】定着ローラ100には、オイル塗布パッド150のオイルがオイル塗布ローラ151で塗布され、定着時に記録紙が容易に剥離できるようにしている。また、定着ローラ100には、クリーニングローラ152が接触して配置され、定着ローラ100に付着する画像を形成するトナーの剥離残やゴミ等を除去する。

【0041】加圧ローラ200と定着ローラ100に対して記録紙の搬送方向上流側には、記録紙の搬送をガイドするガイド板153、154が設けられ、搬送方向下流側には上定着爪155及び下定着爪156が設けられている。

【0042】さらに、加圧ローラ200の近傍には、加圧ローラ温度検知手段S1である温度検知センサが設けられ、定着ローラ100の近傍には、定着ローラ温度検知手段S2である温度検知センサが設けられ、この温度検知センサから得られる温度情報に基づき、制御部62により加圧ローラ200のヒータH1及び定着ローラ100のヒータH2の制御を行う。

【0043】図3はヒータ駆動装置の概略ブロック図である。制御部62は、温度制御部620、ヒータ制御部621、ヒータ駆動部622、623から構成されている。温度制御部620は、加圧ローラ温度検知手段S1及び定着ローラ温度検知手段S2からの温度情報を得て、それぞれの温度情報をヒータ制御部621へ送る。

【0044】ヒータ制御部621は、温度制御部620

から送られる温度情報に基づき、ヒータ駆動部622、623を制御する。ヒータ駆動部622は、位相制御を実施して加圧ローラ200のヒータH1を駆動する。ヒータ駆動部623は、着ローラ100のヒータH2を駆動し、このヒータH2は複数の2本である。ヒータH1及びヒータH2には、商用電源の電源電圧Eが印加される。

【0045】次に、ヒータ制御部621の制御を、図4乃至図7に基づいて詳細に説明する。

【0046】図4は1/3波位相制御Aを説明する図である。

【0047】交流の商用電源の電源電圧Eが印加され（図4(a)）、ヒータの駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御（図4(b)）と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施（図4(c)）する。

【0048】図5は全波位相制御B1を説明する図である。

【0049】交流の商用電源の電源電圧Eが印加され（図5(a)）、ヒータの駆動開始時、時間T2の間、導通角を90°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B1を実施（図5(b)、(c)）する。

【0050】図6は全波位相制御B2を説明する図である。

【0051】交流の商用電源の電源電圧Eが印加され（図6(a)）、ヒータの駆動開始時、時間T3の間、導通角を180°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B2を実施（図6(b)、(c)）する。

【0052】図7はゼロクロス駆動制御Cを説明する図である。

【0053】交流の商用電源の電源電圧Eが印加され（図7(a)）、ヒータの駆動開始時、時間T4の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを実施（図7(b)、(c)）する。

【0054】請求項1乃至請求項4記載の発明は、ヒータの駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、時間T2の間、導通角を90°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B1を実施し、時間T3の間、導通角を180°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御B2を実施し、時間T4の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、全波位相

制御B1、全波位相制御B2、ゼロクロス駆動制御Cの順に制御する。

【0055】このように、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間全波位相制御B1を、時間T3の間全波位相制御B2を、時間T4の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0056】また、1/3波位相制御Aの位相制御部の導通角は、90°以下とし、ヒータ駆動開始時、時間T1の間1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0057】また、全波位相制御B1の時間T2の時間の時間は、1秒以下とし、全波位相制御B1の時間T2の時間の時間は、1秒以下とすることで、よりノイズの発生を抑え、突入電流を減らすことができる。

【0058】また、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と、全波位相制御B1を実施している時間T2と、全波位相制御B2を実施している時間T3の間は、他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、時間T1、時間T2、時間T3の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0059】請求項5乃至請求項7記載の発明は、ヒータ駆動開始時、時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、時間T2の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、1/3波位相制御A、ゼロクロス駆動制御Cの順に制御する。

【0060】このように、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0061】また、1/3波位相制御Aの位相制御部の導通角は、90°以下とし、ヒータ駆動開始時、時間T1の間1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0062】また、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1の間は、他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、時間T1の間は、他のヒータはオフされている場合オンを禁止することで、よりヒ

ータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0063】請求項8乃至請求項11記載の発明は、ヒータ駆動開始時、所定時間T1の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を1波とし3波に1回駆動する1/3波駆動制御とを組み合わせたヒータの1/3波位相制御Aを実施し、所定時間T2の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Bを実施し、所定時間T3の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Cを、前記1/3波位相制御A、全波位相制御B、ゼロクロス駆動制御Cの順に制御する。

【0064】このように、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間全波位相制御Bを、時間T3の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0065】また、1/3波位相制御A、全波位相制御の位相制御部Bの導通角は、共に90°以下とし、ヒータ駆動開始時、1/3波位相制御A、全波位相制御の位相制御部Bの導通角は、共に90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0066】また、全波位相制御Bの時間T2の時間の時間は、1秒以下とし、全波位相制御Bの時間T2の時間の時間は、1秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0067】また、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と全波位相制御Bを実施している時間T2の間は他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と全波位相制御Bを実施している時間T2の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0068】次に、ヒータ制御部621の制御の実施例を、図8に基づいて詳細に説明する。

【0069】ヒータ制御の内容は、以下の通りである。

【0070】メインヒータH2：ヒータ駆動開始時、時間1.5sec間、①1/3波位相制御A実施、時間0.5sec間、②全波位相制御B1（導通角を72°）を実施、時間1.0sec間、③全波位相制御B2（導通角を144°）を実施、時間6.0sec間、④ゼロクロス駆動制御Cを、①→②→③→④の順に実施する。

【0071】①、②、③の制御を実施中は、サブヒータH2と下ヒータH1は、オフの場合、オンを禁止する。

【0072】サブヒータH2：ヒータ駆動開始時、時間

1. 5 sec 間、[A] 1/3 波位相制御 A、1. 5 sec 間、[B] ゼロクロス駆動制御 C を実施し、時間 3. 3 sec 間、[C] ゼロクロス駆動制御 C を実施する。[A]、[B] 制御を実施中は、メインヒータ H2、下ヒータ H1 は、オフの場合、オンを禁止する。

【0073】下ヒータ H1：ヒータ駆動開始時、1. 5 sec 間、[D] 1/3 波位相制御 A 実施、1. 5 sec 間、[E] ゼロクロス駆動制御 C を実施し、時間 3. 3 sec 間、[F] ゼロクロス駆動制御 C を実施する。

[D]、[E] 制御を実施中は、メインヒータ H2、サブヒータ H2 は、オフの場合、オンを禁止する。

【0074】位相制御実施時に、① 1/3 波位相制御で位相制御のみを実施し、導通角  $90^\circ$  以下にてヒータをオンの場合、突入電流の改善になるが高調波に影響を与える。導通角を  $90^\circ$  以上  $180^\circ$  未満にてヒータをオンの場合、高調波に影響を与えないが、突入電流の改善も少なくなる。

【0075】そこで、高調波への影響は少なくし突入電流の改善を行うには、導通角  $72^\circ$  ( $90^\circ$  以下) にし、1/3 波駆動と組み合わせた 1/3 波位相制御を実施する。

【0076】② 全波位相制御 (導通角  $72^\circ$ ) で① 1/3 波位相制御後、④ ゼロクロス駆動制御、または、全波位相制御 (導通角  $90^\circ$  以上  $180^\circ$  未満) を実施した場合、ヒータの温度が低い場合、突入電流が大きい。① 1/3 波位相制御の時間を延長しても、ヒータの温度は飽和しているため、突入電流は抑えられない。

【0077】そこで、導通角  $72^\circ$  (導通角  $90^\circ$  以下) の全波位相制御を実施することにより、突入電流は抑えられる。しかし、導通角  $90^\circ$  以下の全波位相制御は、高調波に影響を与えるため、0. 5 sec 以上は延長できない。

【0078】③ 全波位相制御 (導通角  $144^\circ$ ) で導通角  $72^\circ$  (導通角  $90^\circ$  以下) の全波位相制御後、導通角  $144^\circ$  (導通角  $90^\circ$  以上  $180^\circ$  未満) の全波位相制御を実施し、ゼロクロス駆動制御を実施することにより導通角  $72^\circ$  の全波位相制御後に、ゼロクロス駆動制御を実施するより、突入電流を抑えることができる。

【0079】次に、CE 規格 (EN 61000-33) におけるフリッカ規格の対策として、位相制御を実施し P1t 値により評価を行った。

【0080】

P1t 値 (長時間フリッカ値)：規格値 0. 65 以下  
Pst 値 (短時間フリッカ値)：規格値 1. 00 以下  
P1t 値は、アイドリング中の Pst を 12 回 = 2 時間取り、3 乗平均したものである。

【0081】P1t 値は、突入電流による電圧変動から算出した測定値であり、測定結果は、図 9 のフリッカ測定器により自動測定したものである。

【0082】フリッカ測定は、オートゲインコントロー

ル回路 AGC を備え、入力電圧の実効値  $V_{rms}$  を、“ $\Delta V/V$ ” に影響を与えることなく基準電圧 (本器では試験電圧) に合わせ込む。入力電圧の実効値  $V_{rms}$  の階段状の変動に対し、60 秒の応答時間 (変動幅の 10 → 90% まで変化する時間) を有する。フリッカ測定器が出力する実効値  $V_{rms}$  の値には、オートゲインコントロール回路 AGC 前/後を選択することができる。前を選択した場合、入力電圧の真の実効値を測定することができる。

【0083】フリッカとは、発光物の輝度またはスペクトル分布が、時間によって変化するために引き起こされる視覚の不安定な感覚をいい、例えば、照明がちらついて不快な思いをすること等である。これが、照明の電源電圧の変動によって起きる場合、この電圧変動を人の一般的な感覚を基準にして測れるように設計されたのがフリッカメータであり、なお、コイル状フィラメントのランプ (60W-230V) によるフリッカを基準としている。

【0084】短時間フリッカ値 Pst は、短時間 (IEC 規格では 10 分間と規定) で測定された、フリッカに対する人の刺激反応性を示す値 (フリッカシビアリティ) を短時間フリッカ値 Pst という。Pst = 1 は刺激反応性の一般的な値で、IEC 規格ではこの値を限度値とする。

【0085】長期間フリッカ値 P1t は、長時間 (IEC 規格では Pst 測定を 12 回 = 2 時間と規定) 連続して測定した Pst 値を用いて算出する。これは、人のフリッカに対する刺激反応性を示す値 (フリッカシビアリティ) で、長期間フリッカ値 P1t という。1 回の通常使用時間が 30 分以下の機器は限度値の適用が免除されます (IEC 規格で、特に試験することを指示された機器を除く)。

【0086】フリッカメータは、フリッカの基準とするランプと人の視覚の特性に従って電圧変動に重み付けするフィルタを備えている。このフィルタの出力が重み付け電圧変化 “ $W-\Delta V/V$ ” で、IEC 規格ではフリッカメータの出力として必要なものである。

【0087】瞬時フリッカ値 S (t) は、人の平均的知覚感度を尺度とした単位で、人が感じる事が可能な最低値を 1 (P. U.) としている。単位 P. U. は Perceptibility Unit (知覚単位) の略である。

【0088】 $\sqrt{S(t)}$  は S (t) の開平で、 $\Delta V/V$  に比例した値を出力する。単位は R. U. である。 $\sqrt{S(t)}$  は S (t) の 1 分間積分値で、単位が P. U. である。

【0089】累積確率 P<sub>is</sub> (P<sub>0.1</sub>、P<sub>0.5</sub>、P<sub>0.9</sub>、P<sub>0.95</sub>、P<sub>0.99</sub>) は、瞬時フリッカ値 S (t) を 1024 クラス分類した累積確率曲線から求められ、短時間フリッカ値 Pst を求めるために使用される。

【0090】フリッカ  $P_{st}$  測定モードを以下に示す。

【0091】動作：【IEC1000-3-3、868、868-0の評価方法（フリッカ直接測定の短期間フリッカシビアリティ評価）に適合】

測定時間：1分間～15分間（1分間隔）から選択

表示更新レート：測定値は約1回/秒（変動グラフはリアルタイム表示）

測定結果：

①変動グラフ〔基本測定項目（ $\int S(t)$ ）を除く）の変動グラフ（最大15分間分）、 $P_{st}$  値と判定結果〕

②測定値〔基本測定項目（ $\int S(t)$ ）、 $\int s(t)$  除く）の最大値・最小値・平均値、累積確率  $P_{a1}$ 、 $P_{15}$ 、 $P_{35}$ 、 $P_{100}$ 、 $P_{300}$ 、 $P_{st}$  値と判定結果

演算式：

$$P_{st} = \sqrt{(K_1 P_{a1} + K_2 P_{15} + K_3 P_{35} + K_4 P_{100} + K_5 P_{300})}$$

ただし、 $K_1 = 0.0314$ 、 $K_2 = 0.0525$ 、 $K_3 = 0.0657$ 、 $K_4 = 0.28$ 、 $K_5 = 0.08$

累積確率関数（CPF）分類1024クラス

各累積確率（ $P_i$ ）を線形補間法により求め、更に以下の方法で平滑化した累積確率（ $P_{is}$ ）を算出

$$P_{15} = (P_{a1} + P_1 + P_{100}) / 3, P_{35} = (P_{25} + P_{35} + P_4) / 3$$

$$P_{100} = (P_4 + P_8 + P_{10} + P_{15} + P_{17}) / 5, P_{300} = (P_{30} + P_{30} + P_{30}) / 3$$

フリッカ  $P_{lt}$  測定モード

動作：【IEC1000-3-3-868、868-0の評価方法（フリッカ直接測定の長期間フリッカシビアリティ評価）に適合】

$P_{st}$  測定回数  $N$ ：2～1008回から選択

表示更新レート：測定値は約1回/秒（変動グラフはリアルタイム表示）

測定結果：

①変動グラフ〔 $P_{st}$  値の変動グラフ、 $P_{lt}$  値と判定結果〕

②測定値〔基本測定項目（ $\int S(t)$ ）、 $\int s(t)$  除く）の最大値・最小値、 $P_{lt}$  値と判定結果〕

③  $P_{st}$  リスト〔測定回数分  $P_{a1}$ 、 $P_{15}$ 、 $P_{35}$ 、 $P_{100}$ 、 $P_{300}$ 、 $P_{st}$  値と判定結果〕

演算式：

$$P_{lt} = \sqrt{[(\sum (P_{sti})) / N]}$$

ただし、 $N$ は測定回数

850Wの定着のヒータ1本を使用した場合の1/N波制御測定結果は、表1に示す。

【0092】表1

【0093】

	条件	Plt 値
①	ゼロクロス駆動制御	1.364
②	1/2波	0.839
③	1/3波	0.78
④	1/4波	0.899
⑤	2/4波	1.108

【0094】以上の結果より、3回に1回駆動する1/3波位相制御Aをヒータ駆動開始時に実施する。

【0095】1380Wの定着のヒータにて、1/3波位相制御A、全波位相制御（導通角90°以下）B1、全波位相制御（導通角180°未満）B2、ゼロクロス制御Cの順にヒータの駆動制御を実施した場合の  $P_{lt}$  測定結果を示す。

【0096】

①ゼロクロス制御のみの場合： $P_{lt}$  値2.161

②上記制御を実施した場合： $P_{lt}$  値0.62

よって、上記制御を実施することによりフリッカ規格である  $P_{lt}$  値（0.65以下）をクリアできフリッカ対応に有効な制御である。

【0097】

【発明の効果】前記したように、請求項1記載の発明では、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間全波位相制御B1を、時間T3の間全波位相制御B2を、時間T4の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0098】請求項2記載の発明では、ヒータ駆動開始時、時間T1の間、1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0099】請求項3記載の発明では、全波位相制御B1の時間T2の時間の時間は、1秒以下とすることで、よりノイズの発生を抑え、突入電流を減らすことができる。

【0100】請求項4記載の発明では、複数のヒータが存在する場合、時間T1、時間T2、時間T3の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0101】請求項5記載の発明では、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0102】請求項6記載の発明では、ヒータ駆動開始時、時間T1の間、1/3波位相制御Aの位相制御部の導通角は、90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

きる。

【0103】請求項7記載の発明では、複数のヒータが存在する場合、時間T1の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0104】請求項8記載の発明では、ヒータの駆動開始時、時間T1の間1/3波位相制御Aを、時間T2の間全波位相制御Bを、時間T3の間ゼロクロス駆動制御Cを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0105】請求項9記載の発明では、ヒータ駆動開始時、1/3波位相制御A、全波位相制御の位相制御部Bの導通角は、共に90°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0106】請求項10記載の発明では、全波位相制御Bの時間T2の時間は、1秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【0107】請求項11記載の発明では、複数のヒータが存在する場合、1/3波位相制御Aを実施している時間T1と全波位相制御Bを実施している時間T2の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

\*

\*【図面の簡単な説明】

【図1】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器として複写機の概略構成図である。

【図2】定着装置を示す断面図である。

【図3】ヒータ駆動装置の概略ブロック図である。

【図4】1/3波位相制御Aを説明する図である。

【図5】全波位相制御B1を説明する図である。

【図6】全波位相制御B2を説明する図である。

【図7】ゼロクロス駆動制御Cを説明する図である。

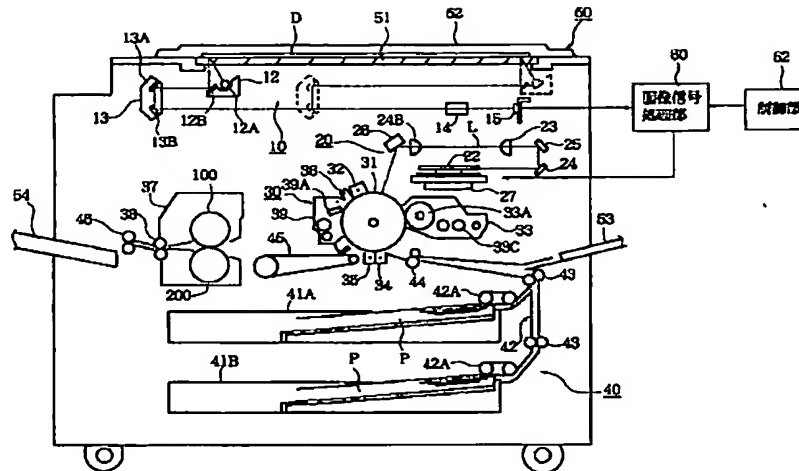
【図8】ヒータ制御部の制御の実施例を説明する図である。

【図9】フリッカ測定器を示すブロック図である。

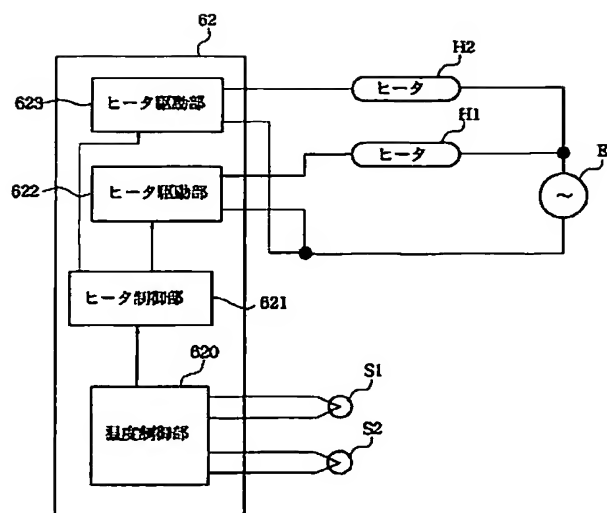
【符号の説明】

- 62 制御部
- 620 温度制御部
- 621 ヒータ制御部
- 622, 623 ヒータ駆動部
- S1 加圧ローラ温度検知手段
- S2 定着ローラ温度検知手段
- A 1/3波位相制御
- B1 全波位相制御
- B2 全波位相制御
- C ゼロクロス駆動制御
- H1 加圧ローラ200のヒータ
- H2 定着ローラ100のヒータ

【図1】



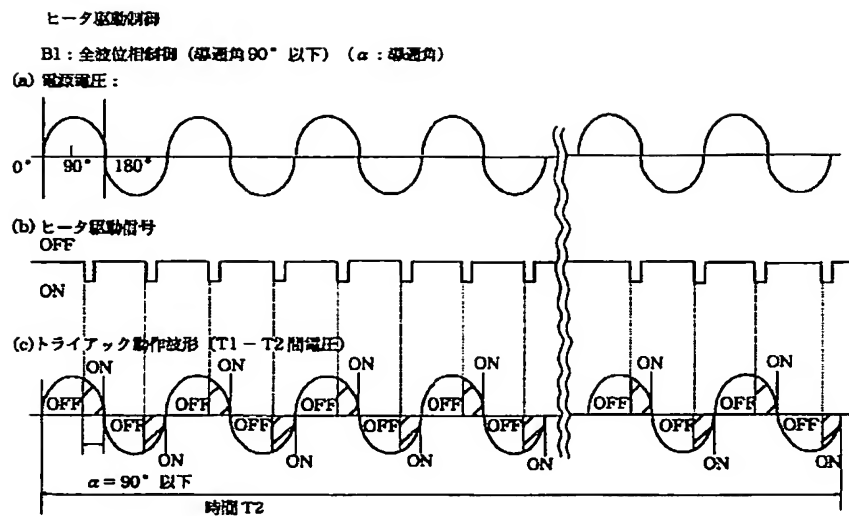
【圖 3】



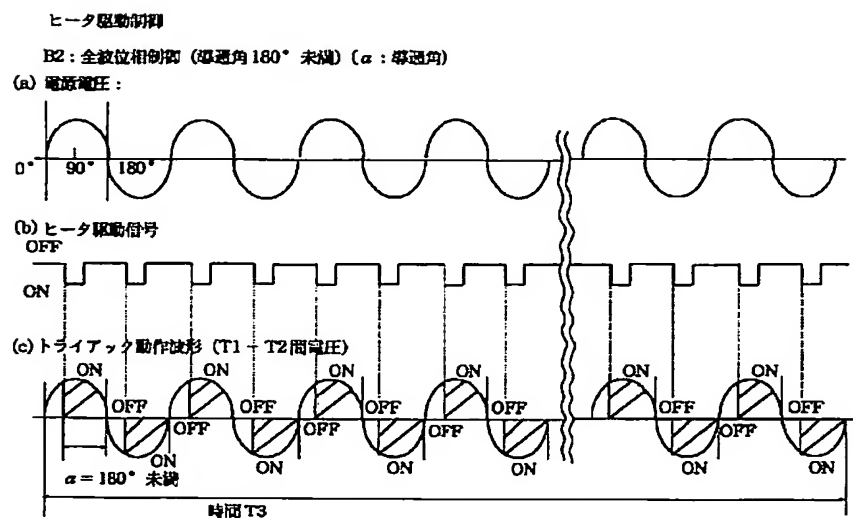
【図 4】

A: 1/3 按位相制御 (導通角 90° 以下) ( $\alpha$ : 導通角)

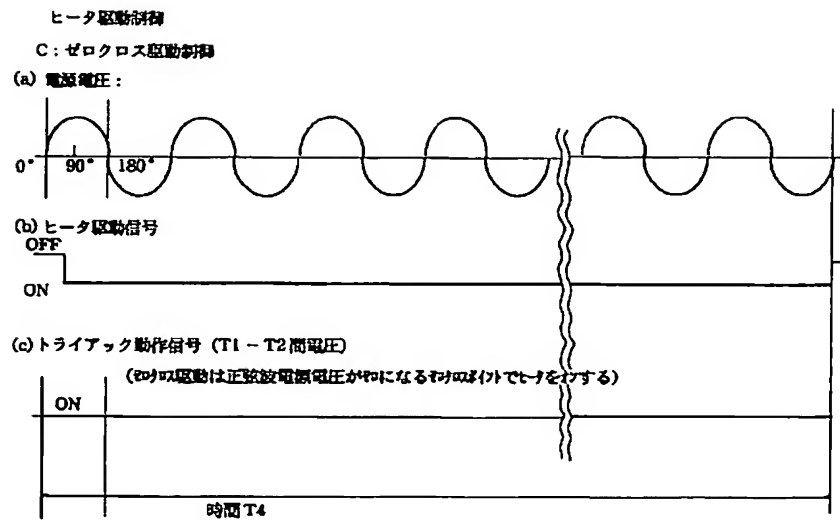
【図5】



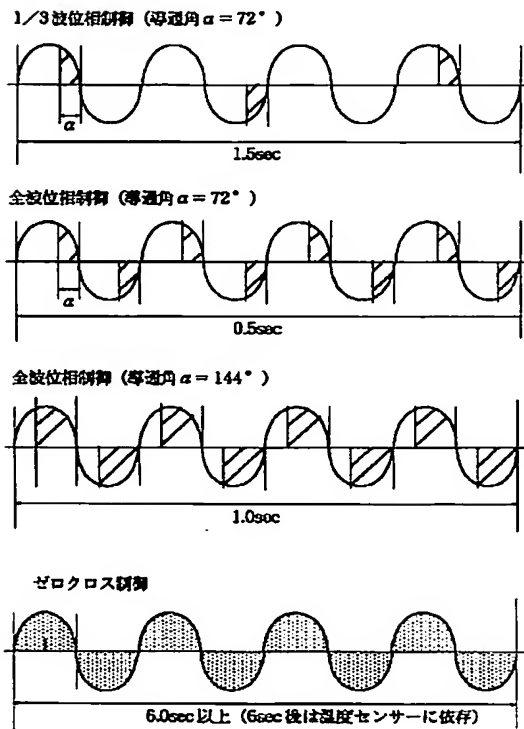
【図6】



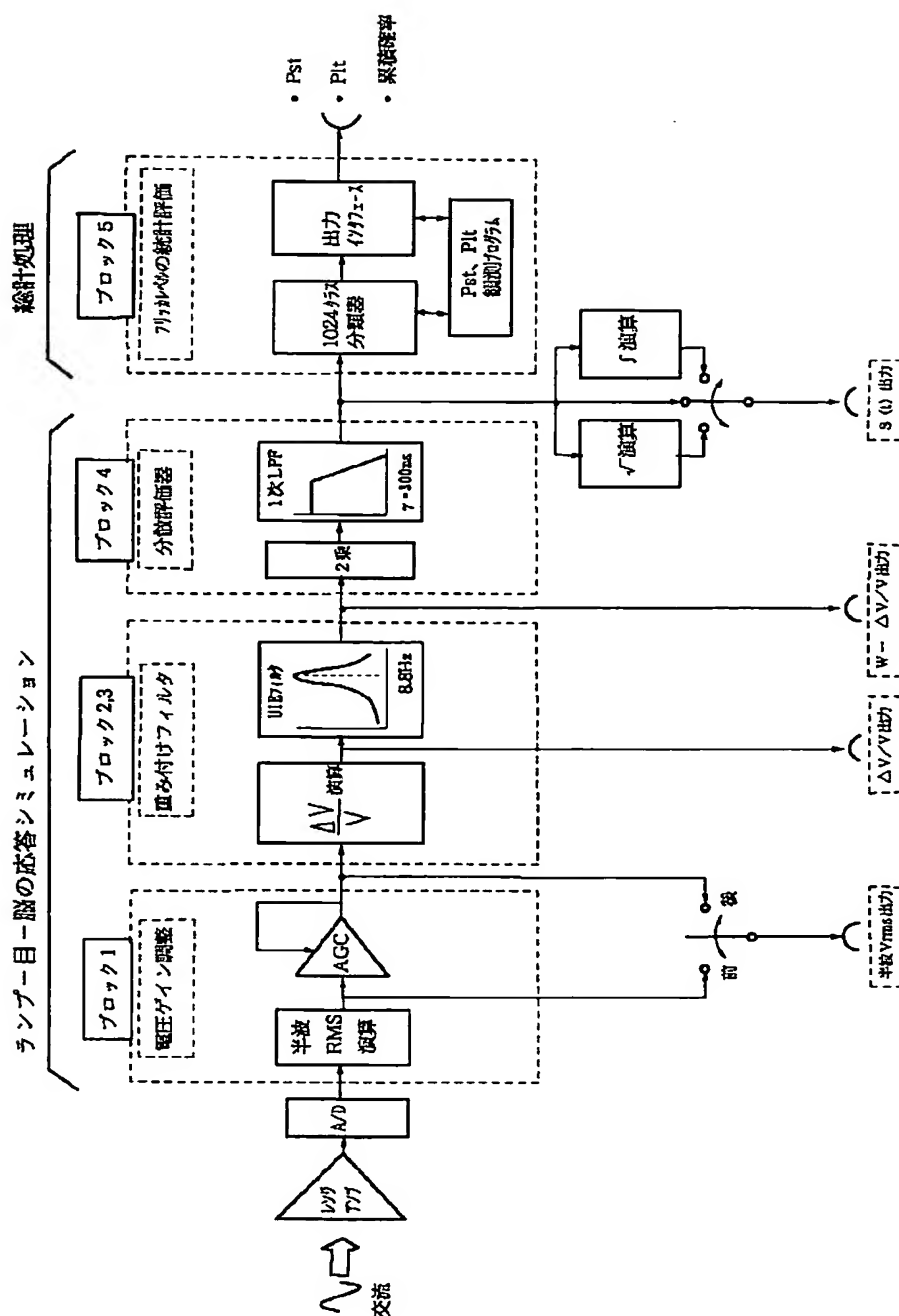
【図 7】



【図 8】



【図9】



フロントページの続き

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# PATENT ABSTRACTS OF JAPAN

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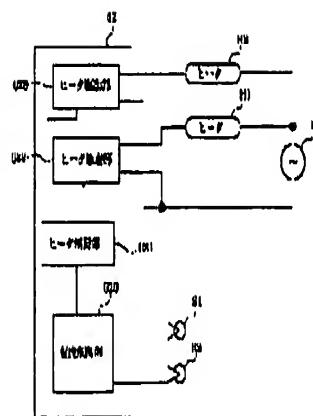
## (54) HEATER DRIVING DEVICE

### (57)Abstract:

#### PROBLEM TO BE SOLVED: To

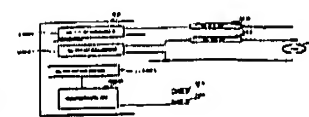
suppress noise from being produced when a heater is driven and also to suppress a rush current by executing control by combining 1/3 wave phase control, full-wave phase control and zero cross driving control in this order when starting to drive the heater.

SOLUTION: A heater controlling part 621 controls heater driving parts 622 and 523, based on temperature information from a temperature



controlling part 620. Then, in the starting of driving the heater, the control A that phase control to turn on and off the heater by the

conduction angle of sine wave power source voltage and 1/3 wave driving control to execute one driving in three waves by making the half wave of a sine wave into one wave are combined during time T1, the control B1 that phase control to set the conduction angle to  $\leq 90^\circ$  and full-wave driving control are combined during the time T2, the control B2 that the phase control to set the conduction angle to  $< 180^\circ$  and the full-wave driving control are combined during the time T3 and the control C to turn on the heater at a zero cross point at which the sine wave power source voltage becomes zero during the time T4 are executed. Then, the controls are executed in this order.



## LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes the conduction angle between time amount T3 less than 180 degrees, and full wave actuation control is carried out. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross actuation control C.

[Claim 2] The conduction angle of the phase control section of said 1 / 3 wave phase control A is a heater driving gear according to claim 1 characterized by considering as 90 degrees or less.

[Claim 3] The time amount of the time amount of the time amount T2 of said full wave phase control B1 is a heater driving gear according to claim 1 or 2 characterized by considering as 1 or less second.

[Claim 4] Actuation of other heaters is the heater driving gear according to claim 1 to 3 characterized by forbidding ON when turned off between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, the time amount T2 which is carrying out full wave

phase control B1, and time amount T3 which is carrying out full wave phase control B-2.

[Claim 5] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater in order of said 1 / 3 wave phase control A, and the zero cross actuation control C by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2.

[Claim 6] The conduction angle of the phase control section of said 1 / 3 wave phase control A is a heater driving gear according to claim 5 characterized by considering as 90 degrees or less.

[Claim 7] Actuation of other heaters is the heater driving gear according to claim 5 or 6 characterized by forbidding ON when turned off between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist.

[Claim 8] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross actuation control C by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3.

[Claim 9] Both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control are heater driving gears according to claim 8 characterized by considering as 90 degrees or less.

[Claim 10] The time amount of the time amount T2 of said full wave phase control B is a heater driving gear according to claim 8 or 9 characterized by considering as 1 or less second.

[Claim 11] It is the heater driving gear according to claim 8 to 9

characterized by forbidding ON when actuation of other heaters is turned off between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[0002]

[Description of the Prior Art] Conventionally, there is a thing equipped with the anchorage device which has a heater as a heat source inside a heating roller in a copying machine, and heater actuation of this anchorage device is the zero cross point with which the sinusoidal supply voltage of a source power supply becomes zero, and is driving the heater 1 to 3 times to two - four half waves of that frequency period the early stages of actuation.

[0003]

[Problem(s) to be Solved by the Invention] Since the conventional heater actuation turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero, the rush current generates it. In order to suppress the rush current, there is a heater driving gear turned on and off according to the conduction angle of sinusoidal supply voltage. in this heater driving gear, although the rush current can be suppressed to some extent until, in order to turn on and off according to the conduction angle of sinusoidal supply voltage, there is a possibility of a noise occurring and causing malfunction of an electromagnetic interference or a device.

[0004] This invention aims at offering the heater driving gear which it was made in view of this actual condition, and generating of the noise at the time of heater actuation is suppressed, and can suppress the rush current.

[0005]

[Means for Solving the Problem] In order to solve said technical problem and to attain the object, this invention was constituted as follows.

[0006] In the heater driving gear of the device by which invention according

to claim 1 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3. time amount -- T four -- between -- a sine wave -- supply voltage -- zero -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- one -- a full wave -- phase control -- B-2 -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- \*\* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0007] According to this invention according to claim 1, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0008] Invention according to claim 2 is "a heater driving gear according to claim 1 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0009] According to this invention according to claim 2, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less at the time of heater actuation initiation.

[0010] Invention according to claim 3 is "a heater driving gear according to claim 1 or 2 characterized by making time amount of the time amount of the time amount T2 of said full wave phase control B1 into 1 or less second."

[0011] According to this invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0012] The time amount T1 to which invention according to claim 4 is

carrying out 1 / 3 wave phase control A when the heater of "plurality exists, a full wave -- phase control -- B -- one -- carrying out -- \*\*\*\* -- time amount -- T -- two -- a full wave -- phase control -- B-2 -- carrying out -- \*\*\*\* -- time amount -- T3 -- between -- others -- a heater -- actuation -- turning off -- having -- \*\*\*\* -- a case -- ON -- forbidding -- things -- the description -- \*\* -- carrying out -- being according to claim 1 to 3 -- a heater -- a driving gear -- " -- it is .

[0013] When two or more heaters exist according to this invention according to claim 4, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0014] In the heater driving gear of the device by which invention according to claim 5 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. time amount -- T -- two -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- \*\* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0015] According to this invention according to claim 5, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order.

[0016] Invention according to claim 6 is "a heater driving gear according to claim 5 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0017] According to this invention according to claim 6, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less at the time of heater actuation initiation.

[0018] Invention according to claim 7 is "a heater driving gear according to claim 5 or 6 characterized by forbidding ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters

exist when actuation of other heaters is turned off."

[0019] When two or more heaters exist according to this invention according to claim 7, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.

[0020] In the heater driving gear of the device by which invention according to claim 8 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2, predetermined time -- T3 -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- \*\* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0021] According to this invention according to claim 8, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order.

[0022] Invention according to claim 9 is "a heater driving gear according to claim 8 characterized by making both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less."

[0023] According to this invention according to claim 9, at the time of heater actuation initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less.

[0024] Invention according to claim 10 is "a heater driving gear according to claim 8 or 9 characterized by making time amount of the time amount T2 of said full wave phase control B into 1 or less second."

[0025] According to this invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of heater

actuation more, and can suppress the rush current.

[0026] Invention according to claim 11 is "a heater driving gear according to claim 8 to 9 characterized by forbidding ON between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B when actuation of other heaters is turned off."

[0027] Between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist according to this invention according to claim 11, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0028]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the heater driving gear of this invention is explained based on a drawing.

[0029] Drawing 1 is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[0030] First, the usual copy actuation of this copying machine is explained. This copying machine consists of the image reading unit 10, the write-in unit 20 which is a digital write-in system, the image formation section 30, the feed section 40, and manuscript installation section 50 grade.

[0031] There are the manuscript base 51 which consists of a transparent glass plate etc., and the manuscript installation section 50 which consists of wrap manuscript covering 52 grade the manuscript D further laid on the manuscript base 51 in the copying machine upper part, it is the lower part of the manuscript base 51, and the image reading unit 10 which consists of image sensor 15 grades, such as the 1st mirror unit 12, the 2nd mirror unit 13, the image pick-up lens 14, and a CCD array, is formed in the body of equipment.

[0032] The parallel displacement to the location which shows the image of the manuscript D on the manuscript base 51 with a broken line from the continuous line of the 1st mirror unit 12 equipped with lighting lamp 12A and 1st mirror 12B of the image reading unit 10, Imitation migration of the rate of 1/2 to the 1st mirror unit 12 of the 2nd mirror unit 13 which counters and is equipped with 2nd mirror 13A and 3rd mirror 13B in one carries out the lighting scan of the whole surface. Image formation of the image is carried out on an image sensor 15 through 1st mirror 12B, 2nd mirror 13A, and 3rd mirror 13B with the image pick-up lens 14. After a scan finishes, the 1st mirror unit 12 and the 2nd mirror unit 13 stand by till return and the next image formation in the original location.

[0033] After the image data which photo electric translation was carried out

and was obtained by the image sensor 15 is changed into a digital signal, an image processing is made by the picture signal processing section 60, and it is once stored in memory 61 as a picture signal. Subsequently, a picture signal is inputted into the trailer lump unit 20 in which reading appearance was carried out by control of a control section 62 and by which Pulse Density Modulation was carried out from memory 61.

[0034] The image formation section 30 will start image recording actuation, if a picture signal is inputted into the write-in unit 20 which consists of a drive motor 27, the polygon mirror 22, the ftheta lens 23, mirrors 24, 25, and 26 and semiconductor laser that is not illustrated, correcting lens 24B, etc. by control of a control section 62. That is, the photo conductor drum 31 which is image support rotates clockwise like \*\*\*\*, and since the charge is given to the electric discharge discharge electricity by performing an electrification pre-exposure with the electrification vessel 32 after it is discharged with the electric discharge vessel 36, on the photo conductor drum 31, the electrostatic latent image corresponding to the image of Manuscript D is formed of a laser beam L with the write-in unit 20. Then, with the developer supported on development sleeve 33A which is the developer support which impressed the bias voltage of a development counter 33, reversal development is performed and said electrostatic latent image on the photo conductor drum 31 turns into a visible toner image.

[0035] On the other hand, from sheet paper cassette 41A\*\*41B with which the feed section 40 was loaded, it takes out one sheet at a time the transfer paper P of the appointed size by taking-out roller 42A, and paper is fed toward the imprint section of an image through the taking-out roller 43 and the guide member 42. Therefore, the transfer paper P to which paper was fed is sent out to the resist roller 44 which operates synchronizing with the toner image on the photo conductor drum 31 on the photo conductor drum 31. After the toner image on the photo conductor drum 31 was imprinted by the operation of the imprint machine 34, and being separated into this transfer paper P from on the photo conductor drum 31 by the electric discharge operation of an eliminator 35, being sent to an anchorage device 37 through the conveyance belt 45 and carrying out melting fixation with a fixing roller 100 and the application-of-pressure roller 200, it is discharged with the delivery rollers 38 and 46 to the tray 54 besides equipment. 53 is a feed base for manual bypass.

[0036] said photo conductor drum 31 should boil the toner which remained without continuing a revolution further and the front face imprinting electrification machine 32, after clearance cleaning is carried out by cleaning-blade 39A which carries out a pressure welding in cleaning equipment 39 and electricity is again discharged with the electric discharge vessel 36 -- in response to grant of a charge, it goes into Mr. Lee at the

process of next image formation.

[0037] In addition, the permeability sensor TS formed in the pars basilaris ossis occipitalis of stirring screw 33C of a development counter 33 is a sensor which will supervise the toner concentration of the developer in a development counter 33 using permeability changing if the toner concentration of a developer changes, and sends out the toner concentration information on a developer to a control section 62. Since a control section 62 will send out directions of toner makeup to a toner makeup unit and will perform toner makeup if \*\* RITONA concentration decreases to the information on the permeability sensor TS below at constant value, the toner concentration of a developer is always uniformly maintainable.

[0038] Next, an anchorage device 37 is explained based on drawing 2. Drawing 2 is the sectional view showing an anchorage device.

[0039] In the casing 300 of an anchorage device 37, the application-of-pressure roller 200 and the fixing roller 100 which constitutes a heating roller are arranged. The silicone rubber layer 231 is formed in the barrel 230 of SUS, and, as for the application-of-pressure roller 200, one heater H1 is arranged inside the barrel 230. A fixing roller 100 coats and forms the resin layer 141 in the barrel 140 of aluminum, and two heaters H2 are arranged inside the barrel 140 of aluminum.

[0040] The oil of the oil spreading pad 150 is applied to a fixing roller 100 with the oil spreading roller 151, and the recording paper enables it to exfoliate easily at the time of fixation. Moreover, to a fixing roller 100, a cleaning roller 152 contacts, and is arranged and \*\*\*\*\*, dust, etc. of a toner which form the image adhering to a fixing roller 100 are removed.

[0041] The guide plate 153,154 which guides conveyance of the recording paper is formed in the conveyance direction upstream of the recording paper to the application-of-pressure roller 200 and a fixing roller 100, and the up fixation pawl 155 and the bottom fixation pawl 156 are formed in the conveyance direction downstream.

[0042] Furthermore, near the application-of-pressure roller 200, the temperature detection sensor which is the application-of-pressure roller temperature detection means S1 is formed, the temperature detection sensor which is the fixing roller temperature detection means S2 is formed near the fixing roller 100, and the heater H1 of the application-of-pressure roller 200 and the heater H2 of a fixing roller 100 are controlled by the control section 62 based on the temperature information acquired from this temperature detection sensor.

[0043] Drawing 3 is the outline block diagram of a heater driving gear. The control section 62 consists of the temperature control section 620, a heater control section 621, and a heater actuator 622,623. The temperature control section 620 acquires the temperature information from the

application-of-pressure roller temperature detection means S1 and the fixing roller temperature detection means S2, and sends each temperature information to the heater control section 621.

[0044] The heater control section 621 controls the heater actuator 622,623 based on the temperature information sent from the temperature control section 620. The heater actuator 622 carries out phase control and drives the heater H1 of the application-of-pressure roller 200. The heater actuator 623 wears, and drives the heater H2 of a roller 100, and this heater H2 is two or more two. The supply voltage E of a source power supply is impressed to a heater H1 and a heater H2.

[0045] Next, control of the heater control section 621 is explained to a detail based on drawing 4 thru/or drawing 7.

[0046] Drawing 4 is drawing explaining 1 / 3 wave phase control A.

[0047] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 4 (a)), and 1 / 3 wave phase control A of the heater which combined the phase control ( drawing 4 (b)) which turns a heater on and off according to the conduction angle of sinusoidal supply voltage, and 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out between time amount T1 at the time of actuation initiation of a heater ( drawing 4 (c)).

[0048] Drawing 5 is drawing explaining the full wave phase control B1.

[0049] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 5 (a)), and full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2 at the time of actuation initiation of a heater ( drawing 5 (b), (c)).

[0050] Drawing 6 is drawing explaining full wave phase control B-2.

[0051] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 6 (a)), and full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3 at the time of actuation initiation of a heater ( drawing 6 (b), (c)).

[0052] Drawing 7 is drawing explaining the zero cross actuation control C.

[0053] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 7 (a)), and zero cross actuation control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero is carried out between time amount T four at the time of actuation initiation of a heater ( drawing 7 (b), (c)).

[0054] The phase control to which invention according to claim 1 to 4 turns a heater on and off according to the conduction angle of sinusoidal supply

voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross actuation control C.

[0055] Thus, at the time of actuation initiation of a heater, by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0056] Moreover, generating of the noise at the time of heater actuation can be suppressed [ by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less ] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0057] Moreover, time amount of the time amount of the time amount T2 of the full wave phase control B1 is made into 1 or less second, and by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0058] Moreover, the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, Between the time amount T2 which is carrying out full wave phase control B1, and time amount T3 which is carrying out full wave phase control B-2 When ON is forbidden when turned off, and two or more heaters exist, actuation of other heaters between time amount T1, time amount T2, and time amount T3 By forbidding ON, when turned off, other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0059] The phase control to which invention according to claim 5 to 7 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1

/ 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2 in order of 1 / 3 wave phase control A, and the zero cross actuation control C. [0060] Thus, at the time of actuation initiation of a heater, by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0061] Moreover, generating of the noise at the time of heater actuation can be suppressed [ by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less ] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0062] Moreover, when ON is forbidden between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when actuation of other heaters is turned off, and two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.

[0063] The phase control to which invention according to claim 8 to 11 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3 in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross actuation control C.

[0064] Thus, at the time of actuation initiation of a heater, by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0065] Moreover, generating of the noise at the time of heater actuation can

be suppressed [ by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less ] more by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0066] Moreover, generating of the noise at the time of heater actuation can be suppressed more by making time amount of the time amount T2 of the full wave phase control B into 1 or less second by making time amount of the time amount T2 of the full wave phase control B into 1 or less second, and the rush current can be suppressed.

[0067] Moreover, actuation of the heater of others [ between / the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B ] When are turned off, and ON is forbidden and two or more heaters exist, Between the time amount T1 which is carrying out 1 / 3 wave phase control A, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0068] Next, the example of control of the heater control section 621 is explained to a detail based on drawing 8.

[0069] The content of heater control is as follows.

[0070] Main heater H2: Carry [ \*\* full wave phase control B1 (it is a conduction angle 72 degrees) ] out \*\* zero cross actuation control C for \*\* full wave phase control B-2 (it is a conduction angle 144 degrees) in order of \*\*->\*\*->\*\* between operation and time amount 6.0sec between operation and time amount 1.0sec between time amount 1.5sec(s) between \*\* / 3 wave phase control A operation, and time amount 0.5sec at the time of heater actuation initiation.

[0071] \*\* While carrying out control of \*\* and \*\*, the subheater H2 and the bottom heater H1 forbid ON, when off.

[0072] Subheater H2: At the time of heater actuation initiation, carry out [B] zero cross actuation control C between [A] 1 / 3 wave phase control A, and 1.5sec between time amount 1.5sec(s), and carry out [C] zero cross actuation control C between time amount 3.3sec(s). While carrying out [A] and [B] control, the Main heater H2 and the bottom heater H1 forbid ON, when off.

[0073] Bottom heater H1: At the time of heater actuation initiation, carry out [E] zero cross actuation control C between 1.5sec(s) between [D] 1 / 3 wave phase control A operation, and 1.5sec, and carry out [F] zero cross actuation control C between time amount 3.3sec(s). While carrying out [D] and [E]

control, the Main heater H2 and the subheater H2 forbid ON, when off.

[0074] At the time of phase control implementation, only phase control is carried out by  $1/3$  wave phase control, and, in ON of a heater, it becomes an improvement of the rush current at 90 degrees or less of conduction angles, but a higher harmonic is affected. In ON [ a conduction angle ] of a heater at 90 degrees or more less than 180 degrees, a higher harmonic is not affected, but an improvement of the rush current also decreases.

[0075] Then, in order to lessen and to improve the rush current, effect on a higher harmonic is used as 72 degrees (90 degrees or less) of conduction angles, and carries out  $1/3$  wave phase control combined with  $1/3$  wave actuation.

[0076] \*\* When \*\* zero cross actuation control or full wave phase control (less than 180 degrees of 90-degree or more conduction angles) is carried out after  $1/3$  wave phase control by full wave phase control (72 degrees of conduction angles), since the temperature of a heater is low, the rush current is large. \*\* Even if it extends the time amount of  $1/3$  wave phase control, since the temperature of a heater is saturated, the rush current is not suppressed.

[0077] Then, the rush current is suppressed by carrying out full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles). However, since the full wave phase control of 90 degrees or less of conduction angles affects a higher harmonic, 0.5 or more secs are inextensible.

[0078] \*\* By carrying out full wave phase control of 144 degrees of conduction angles (less than 180 degrees of 90-degree or more conduction angles) by full wave phase control (144 degrees of conduction angles) after the full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles), and carrying out zero cross actuation control, the rush current can be suppressed rather than it carries out zero cross actuation control after the full wave phase control of 72 degrees of conduction angles.

[0079] Next, as a cure of the flicker specification in CE specification (EN 61000-33), phase control was carried out and the Plt value estimated.

[0080]

Plt value (long duration flicker value): -- 0.65 or less value-of-standard Pst value (short-time flicker value): -- a 1.00 or less value-of-standard Plt value takes Pst under idling for 12 times = 2 hours, and carries out a cube average.

[0081] A Plt value is the measured value computed from the voltage variation by the rush current, and a measurement result is measured automatically with the flicker measuring instrument of drawing 9.

[0082] Flicker measurement is equipped with the automatic gain control

circuit AGC, and it doubles the actual value  $V_{rms}$  of input voltage with reference voltage (the present instrument test voltage), without affecting "deltaV/V." It has the response time for 60 seconds (time amount which changes to 10~90% of the range of fluctuation) to stair-like fluctuation of the actual value  $V_{rms}$  of input voltage. Before automatic gain control circuit AGC / back can be chosen as the value of the actual value  $V_{rms}$  which a flicker measuring instrument outputs. When a front is chosen, the true RMS of input voltage can be measured.

[0083] A flicker is saying the unstable sensation of the vision to which the brightness or spectrum distribution of a luminescence object is caused in order to change with time amount, for example, lighting's flickering, and feeling unpleasant etc. When this occurs by fluctuation of the supply voltage of lighting, it is flicker meter, and in addition, having been designed so that this voltage variation could be measured on the basis of people's general sensation is based on the flicker with the lamp (60W-230V) of a coiled form filament, and it is.

[0084] The short flicker value Pst calls the value (flicker severe RITI) which shows people's sensitivity over a flicker measured for a short period of time (IEC standards prescribe for 10 minutes) the short flicker value Pst. Pst=I is the general value of sensitivity and makes this value a limit value in IEC standards.

[0085] A flicker value Plt is computed for a long period of time using the measured Pst value which carried out long duration (Pst measurement is specified as 12 time =2 hour by IEC standards) continuation. This is the value (flicker severe RITI) which shows the sensitivity over people's flicker, and calls it a flicker value Plt for a long period of time. Application of a limit value is exempted from the device for 30 or less minutes to 1 time of a usual time (except for the device to which it is IEC standards and having examined especially was directed).

[0086] Flicker meter is equipped with the filter which carries out weighting to voltage variation according to the property of the vision of the lamp made into the criteria of a flicker, and a man. The output of this filter is weighting electrical-potential-difference change "W-delta V/V", and is required of IEC standards as an output of flicker meter.

[0087] Instant flicker value S (t) is the unit which made people's average perception sensibility the scale, and is setting to 1 (P. U.) the minimum value in which what people sense is possible. Unit P.U. is Perceptibility. It is the abbreviation for Unit (perception unit).

[0088] rootS (t) is the extraction of the square root of S (t), and outputs the value proportional to deltaV/V. A unit is R.U. rootS (t) is the 1 minute integral value of S (t), and a unit is P.U.

[0089] the accumulation probability music into which the accumulation

probability  $P_i$ s ( $P_{0.1}$ ,  $P_{1s}$ ,  $P_{3s}$ ,  $P_{10s}$ ,  $P_{50s}$ ) classified 1024 classes instant flicker value  $S(t)$  -- it is used in order to ask and to calculate the short flicker value  $P_{st}$ , since green.

[0090] Flicker  $P_{st}$  measurement mode is shown below.

[0091] Actuation: It is adaptation] to the assessment approach (short flicker severe RITI assessment of flicker direct measurement) of [IEC

1000-3-3,868,868-0.

measuring-time: -- renewal rate of the selection display from for [ between / 1 part / - ] 15 minutes (1 part spacing): -- measured value -- about 1 times (a fluctuation graph is a real-time display)/second

Measurement result: \*\* fluctuation graph [the fluctuation graph (a part for for a maximum of 15 minutes) of a basic parameter (except for integral  $S(t)$ ), a  $P_{st}$  value, and a judgment result]

\*\* The maximum, minimum value and average, accumulation probability  $P_{0.1}$ ,  $P_{1s}$ ,  $P_{3s}$ ,  $P_{10s}$ ,  $P_{50s}$ , and  $P_{st}$  value and judgment result operation

expression of a measured-value [basic parameter (integrals [  $\sqrt{S(t)}$  and ] (t) remove) :  $P_{st} = \sqrt{K_1 P_{0.1} + K_2 P_{1s} + K_3 P_{3s} + K_4 P_{10s} + K_5 P_{50s}}$

However,  $K_1=0.0314$ ,  $K_2=0.0525$ ,  $K_3=0.0657$ ,  $K_4=0.28$ , and  $K_5=0.08$

accumulation probability function (CPF) classification 1024 class each accumulation probability ( $P_i$ ) are searched for by the linear interpolation

method. Furthermore, the accumulation probability ( $P_i$ s) graduated by the following approaches Calculation  $P_{1s} = (P_{0.7} + P_{1s} + P_{10s})/3$ ,  $P_{3s} =$

$(P_{2.2} + P_{3s} + P_4) / 3$   $P_{10s} =$  It is adaptation] to  $(P_6 + P_8 + P_{10} + P_{13} + P_{17})/5$  and

the assessment approach (prolonged flicker severe RITI assessment of flicker direct measurement) of  $p_{50s} = (P_{30} + P_{50} + P_{80})/3$  flicker  $P_{it}$

measurement mode actuation:[IEC] 000-3-3-868,868-0.

From N:two - 1008  $P_{st}$  measurement counts to the renewal rate of a selection display: Measured value is about 1 times (a fluctuation graph is a real-time display)/second.

Measurement result: \*\* fluctuation graph [the fluctuation graph of a  $P_{st}$  value, a  $P_{it}$  value, and a judgment result]

\*\* Measured value [the maximum and the minimum value of a basic parameter (integrals [  $\sqrt{S(t)}$  and ] (t) remove), a  $P_{it}$  value, and a judgment result]

\*\* It is  $P_{0.1}$ ,  $P_{1s}$ ,  $P_{3s}$ ,  $P_{10s}$ ,  $P_{50s}$ ,  $P_{st}$  value, and judgment result] by the  $P_{st}$  list [measurement count.

Operation expression-It= $\sqrt{(\sum P_{sti}) / N}$

However, a 1-/N wave control measurement result when N uses one heater of fixation of measurement count 850W is shown in a table 1.

[0092] Table 1 [0093]

	条件	Plt 値
①	ゼロクロス駆動制御	1.364
②	1/2波	0.839
③	1/3波	0.78
④	1/4波	0.889
⑤	2/4波	1.108

[0094] From the above result, 1 / 3 wave phase control A driven once to 3 times are carried out at the time of heater actuation initiation.

[0095] The  $P_{it}$  measurement result at the time of carrying out actuation control of a heater at the heater of fixation of 1380W in order of 1 / 3 wave phase control A, the full wave phase control (90 degrees or less of conduction angles) B1, full wave phase control (less than 180 degrees of conduction angles) B-2, and the zero cross control C is shown.

[0096]

\*\* In the case [ :P ] only of zero cross control When the It value 2.161\*\* above-mentioned control is carried out It depends It value 0.62, the  $P_{it}$  value (0.65 or less) which is flicker specification by carrying out the above-mentioned control can be cleared, and it is control effective in a flicker response. :P

[0097]

[Effect of the Invention] As described above, in invention according to claim 1, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0098] At the time of heater actuation initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 2.

[0099] In invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0100] In invention according to claim 4, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0101] In invention according to claim 5, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order.

[0102] At the time of heater actuation initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 6.

[0103] In invention according to claim 7, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.

[0104] In invention according to claim 8, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order.

[0105] In invention according to claim 9, at the time of heater actuation initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less.

[0106] In invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0107] In invention according to claim 11, between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B, when turned off, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by forbidding ON.

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[Translation done.]

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## TECHNICAL FIELD

[Field of the Invention] This invention relates to the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

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PRIOR ART

[Description of the Prior Art] Conventionally, there is a thing equipped with the anchorage device which has a heater as a heat source inside a heating roller in a copying machine, and the heater drive of this anchorage device is the zero cross point with which the sinusoidal supply voltage of a source power supply becomes zero, and is driving the heater 1 to 3 times to two - four half waves of that frequency period the early stages of a drive.

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EFFECT OF THE INVENTION

[Effect of the Invention] As described above, in invention according to claim 1, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0098] At the time of heater drive initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 2.

[0099] In invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0100] In invention according to claim 4, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0101] In invention according to claim 5, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order.

[0102] At the time of heater drive initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less in

invention according to claim 6.

[0103] In invention according to claim 7, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0104] In invention according to claim 8, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order.

[0105] In invention according to claim 9, at the time of heater drive initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less.

[0106] In invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0107] In invention according to claim 11, between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B, when turned off, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by forbidding ON.

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## TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since the conventional heater drive turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero, the rush current generates it. In order to suppress the rush current, there is a heater driving gear turned on and off according to the conduction angle of sinusoidal supply voltage. in this heater driving gear, although the rush current can be suppressed to some extent until, in order to turn on and off according to the conduction angle of sinusoidal supply voltage, there is a possibility of a noise occurring and causing malfunction of an electromagnetic interference or a device.

[0004] This invention aims at offering the heater driving gear which it was made in view of this actual condition, and generating of the noise at the time of a heater drive is suppressed, and can suppress the rush current.

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## MEANS

[Means for Solving the Problem] In order to solve said technical problem and to attain the purpose, this invention was constituted as follows.

[0006] In the heater driving gear of the device by which invention according to claim 1 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of drive initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3. time amount -- T four -- between -- a sine wave -- supply voltage -- zero -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- one -- a full wave -- phase control -- B-2 -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- \*\* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0007] According to this invention according to claim 1, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0008] Invention according to claim 2 is "a heater driving gear according to claim 1 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0009] According to this invention according to claim 2, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less at the time of heater drive initiation.

[0010] Invention according to claim 3 is "a heater driving gear according to claim 1 or 2 characterized by making time amount of the time amount of the time amount T2 of said full wave phase control B1 into 1 or less second."

[0011] According to this invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0012] The time amount T1 to which invention according to claim 4 is carrying out 1 / 3 wave phase control A when the heater of "plurality exists, a full wave -- phase control -- B -- one -- carrying out -- \*\*\* -- time amount -- T -- two -- a full wave -- phase control -- B-2 -- carrying out -- \*\*\* -- time amount -- T3 -- between -- others -- a heater -- a drive -- turning off -- having -- \*\*\* -- a case -- ON -- forbidding -- things -- the description -- \*\* -- carrying out -- being according to claim 1 to 3 -- a heater -- a driving gear -- " -- it is .

[0013] When two or more heaters exist according to this invention according to claim 4, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0014] In the heater driving gear of the device by which invention according to claim 5 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. time amount -- T -- two -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- \*\* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0015] According to this invention according to claim 5, at the time of drive

initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order.

[0016] Invention according to claim 6 is "a heater driving gear according to claim 5 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0017] According to this invention according to claim 6, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less at the time of heater drive initiation.

[0018] Invention according to claim 7 is "a heater driving gear according to claim 5 or 6 characterized by forbidding ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when the drive of other heaters is turned off."

[0019] When two or more heaters exist according to this invention according to claim 7, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0020] In the heater driving gear of the device by which invention according to claim 8 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave drive control is carried out between predetermined time T2. predetermined time -- T3 -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- / -- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- \* -- carrying out -- a heater -- a driving gear -- " -- it is .

[0021] According to this invention according to claim 8, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order.

[0022] Invention according to claim 9 is "a heater driving gear according to claim 8 characterized by making both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less."

[0023] According to this invention according to claim 9, at the time of heater drive initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less.

[0024] Invention according to claim 10 is "a heater driving gear according to claim 8 or 9 characterized by making time amount of the time amount T2 of said full wave phase control B into 1 or less second."

[0025] According to this invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0026] Invention according to claim 11 is "a heater driving gear according to claim 8 to 9 characterized by forbidding ON between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B when the drive of other heaters is turned off."

[0027] Between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist according to this invention according to claim 11, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0028]

[Embodiment of the invention] Hereafter, the gestalt of operation of the heater driving gear of this invention is explained based on a drawing.

[0029] Drawing 1 is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[0030] First, the usual copy actuation of this copying machine is explained. This copying machine consists of the image reading unit 10, the write-in unit 20 which is a digital write-in system, the image formation section 30, the feed section 40, and manuscript installation section 50 grade.

[0031] There are the manuscript base 51 which consists of a transparent glass plate etc., and the manuscript installation section 50 which consists of wrap manuscript covering 52 grade the manuscript D further laid on the manuscript base 51 in the copying machine upper part, it is the lower part of the manuscript base 51, and the image reading unit 10 which consists of

image sensor 15 grades, such as the 1st mirror unit 12, the 2nd mirror unit 13, the image pick-up lens 14, and a CCD array, is formed in the body of equipment.

[0032] The parallel displacement to the location which shows the image of the manuscript D on the manuscript base 51 with a broken line from the continuous line of the 1st mirror unit 12 equipped with lighting lamp 12A and 1st mirror 12B of the image reading unit 10, imitation migration of the rate of 1/2 to the 1st mirror unit 12 of the 2nd mirror unit 13 which counters and is equipped with 2nd mirror 13A and 3rd mirror 13B in one carries out the lighting scan of the whole surface. Image formation of the image is carried out on an image sensor 15 through 1st mirror 12B, 2nd mirror 13A, and 3rd mirror 13B with the image pick-up lens 14. After a scan finishes, the 1st mirror unit 12 and the 2nd mirror unit 13 stand by till return and the next image formation in the original location.

[0033] After the image data which photo electric conversion was carried out and was obtained by the image sensor 15 is changed into a digital signal, an image processing is made by the picture signal processing section 60, and it is once stored in memory 61 as a picture signal. Subsequently, a picture signal is inputted into the trailer lump unit 20 in which Pulse Density Modulation was read and carried out by control of a control section 62 from memory 61.

[0034] The image formation section 30 will start image recording actuation, if a picture signal is inputted into the write-in unit 20 which consists of a drive motor 27, the polygon mirror 22, the ftheta lens 23, mirrors 24, 25, and 26 and semiconductor laser that is not illustrated, correcting lens 24B, etc. by control of a control section 62. That is, the photo conductor drum 31 which is image support rotates clockwise like \*\*\*, and since the charge is given to the electric discharge discharge electricity by performing an electrification pre-exposure with the electrification vessel 32 after it is discharged with the electric discharge vessel 36, on the photo conductor drum 31, the electrostatic latent image corresponding to the image of Manuscript D is formed of a laser beam L by the write-in unit 20. Then, with the developer supported on development sleeve 33A which is the developer support which impressed the bias voltage of a development counter 33, reversal development is performed and said electrostatic latent image on the photo conductor drum 31 turns into a visible toner image.

[0035] On the other hand, from sheet paper cassette 41A\*\*41B with which the feed section 40 was loaded, it takes out one sheet at a time the transfer paper P of the appointed size by taking-out roller 42A, and paper is fed toward the imprint section of an image through the taking-out roller 43 and the guide member 42. Therefore, the transfer paper P to which paper was fed is sent out to the resist roller 44 which operates synchronizing with the

toner image on the photo conductor drum 31 on the photo conductor drum 31. After the toner image on the photo conductor drum 31 was imprinted by the operation of the imprint machine 34, and being separated into this transfer paper P from on the photo conductor drum 31 by the electric discharge operation of an eliminator 35, being sent to an anchorage device 37 through the conveyance belt 45 and carrying out melting fixing with a fixing roller 100 and the pressurization roller 200, it is discharged with the delivery rollers 38 and 46 to the tray 54 besides equipment. 53 is a feed base for manual bypass.

[0036] said photo conductor drum 31 should boil the toner which remained without continuing rotation further and the front face imprinting electrification machine 32, after removal cleaning is carried out by cleaning-blade 39A which carries out a pressure welding in cleaning equipment 39 and electricity is again discharged with the electric discharge vessel 36 -- in response to grant of a charge, it goes into Mr. Lee at the process of next image formation.

[0037] In addition, the permeability sensor TS formed in the pars basilaris ossis occipitalis of stirring screw 33C of a development counter 33 is a sensor which will supervise the toner concentration of the developer in a development counter 33 using permeability changing if the toner concentration of a developer changes, and sends out the toner concentration information on a developer to a control section 62. Since a control section 62 will send out directions of toner supply to a toner supply unit and will perform toner supply if \*\* RITONA concentration decreases to the information on the permeability sensor TS below at constant value, the toner concentration of a developer is always uniformly maintainable.

[0038] Next, an anchorage device 37 is explained based on drawing 2.

Drawing 2 is the sectional view showing an anchorage device.

[0039] In the casing 300 of an anchorage device 37, the pressurization roller 200 and the fixing roller 100 which constitutes a heating roller are arranged. The silicone rubber layer 231 is formed in the barrel 230 of SUS, and, as for the pressurization roller 200, one heater H1 is arranged inside the barrel 230. A fixing roller 100 coats and forms the resin layer 141 in the barrel 140 of aluminum, and two heaters H2 are arranged inside the barrel 140 of aluminum.

[0040] The oil of the oil spreading pad 150 is applied to a fixing roller 100 with the oil spreading roller 151, and the recording paper enables it to exfoliate easily at the time of fixing. Moreover, to a fixing roller 100, a cleaning roller 152 contacts, and is arranged and \*\*\*\*\*, dust, etc. of a toner which form the image adhering to a fixing roller 100 are removed.

[0041] The guide plate 153,154 which guides conveyance of the recording paper is formed in the conveyance direction upstream of the recording paper

to the pressurization roller 200 and a fixing roller 100, and the Kamisada arrival pawl 155 and the bottom fixing pawl 156 are formed in the conveyance direction downstream.

[0042] Furthermore, near the pressurization roller 200, the temperature detection sensor which is the pressurization roller temperature detection means S1 is formed, the temperature detection sensor which is the fixing roller temperature detection means S2 is formed near the fixing roller 100, and the heater H1 of the pressurization roller 200 and the heater H2 of a fixing roller 100 are controlled by the control section 62 based on the temperature information acquired from this temperature detection sensor.

[0043] Drawing 3 is the outline block diagram of a heater driving gear. The control section 62 consists of the temperature control section 620, a heater control section 621, and a heater mechanical component 622, 623. The temperature control section 620 acquires the temperature information from the pressurization roller temperature detection means S1 and the fixing roller temperature detection means S2, and sends each temperature information to the heater control section 621.

[0044] The heater control section 621 controls the heater mechanical component 622, 623 based on the temperature information sent from the temperature control section 620. The heater mechanical component 622 carries out phase control, and drives the heater H1 of the pressurization roller 200. The heater mechanical component 623 wears, and drives the heater H2 of a roller 100, and this heater H2 is two or more two. The supply voltage E of a source power supply is impressed to a heater H1 and a heater H2.

[0045] Next, control of the heater control section 621 is explained to a detail based on drawing 4 thru/or drawing 7.

[0046] Drawing 4 is drawing explaining 1 / 3 wave phase control A.

[0047] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 4 (a)), and 1 / 3 wave phase control A of the heater which combined the phase control ( drawing 4 (b)) which turns a heater on and off according to the conduction angle of sinusoidal supply voltage, and 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out between time amount T1 at the time of drive initiation of a heater ( drawing 4 (c)).

[0048] Drawing 5 is drawing explaining the full wave phase control B1.

[0049] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 5 (a)), and full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2 at the time of drive initiation of a heater ( drawing 5 (b), (c)).

[0050] Drawing 6 is drawing explaining full wave phase control B-2.

[0051] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 6 (a)), and full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3 at the time of drive initiation of a heater ( drawing 6 (b), (c)).

[0052] Drawing 7 is drawing explaining the zero cross drive control C.

[0053] The supply voltage E of the source power supply of an alternating current is impressed ( drawing 7 (a)), and zero cross drive control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero is carried out between time amount T four at the time of drive initiation of a heater ( drawing 7 (b), (c)).

[0054] The phase control to which invention according to claim 1 to 4 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of drive initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross drive control C.

[0055] Thus, at the time of drive initiation of a heater, by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0056] Moreover, generating of the noise at the time of a heater drive can be suppressed [ by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less ] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0057] Moreover, time amount of the time amount of the time amount T2 of the full wave phase control B1 is made into 1 or less second, and by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating

for a noise more, and can reduce the rush current.

[0058] Moreover, the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, Between the time amount T2 which is carrying out full wave phase control B1, and time amount T3 which is carrying out full wave phase control B-2 When the drive of other heaters forbids ON when turned off, and two or more heaters exist, between time amount T1, time amount T2, and time amount T3 By forbidding ON, when turned off, other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0059] The phase control to which invention according to claim 5 to 7 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2 in order of 1 / 3 wave phase control A, and the zero cross drive control C.

[0060] Thus, at the time of drive initiation of a heater, by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0061] Moreover, generating of the noise at the time of a heater drive can be suppressed [ by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less ] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0062] Moreover, when the drive of other heaters forbids ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when turned off, and two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0063] The phase control to which invention according to claim 8 to 11 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave drive control is carried out

between predetermined time T2. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3 in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross drive control C.

[0064] Thus, at the time of drive initiation of a heater, by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0065] Moreover, generating of the noise at the time of a heater drive can be suppressed [ by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less ] more by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0066] Moreover, generating of the noise at the time of a heater drive can be suppressed more by making time amount of the time amount T2 of the full wave phase control B into 1 or less second by making time amount of the time amount T2 of the full wave phase control B into 1 or less second, and the rush current can be suppressed.

[0067] Moreover, the drive of the heater of others [ between / the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B ] When are turned off, and ON is forbidden and two or more heaters exist, Between the time amount T1 which is carrying out 1 / 3 wave phase control A, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0068] Next, the example of control of the heater control section 621 is explained to a detail based on drawing 8.

[0069] The contents of heater control are as follows.

[0070] Main heater H2: Carry [ \*\* full wave phase control B1 (it is a conduction angle 72 degrees) ] out \*\* zero cross drive control C for \*\* full wave phase control B-2 (it is a conduction angle 144 degrees) in order of \*\*->\*\*->\*\* between operation and time amount 6.0sec between operation and time amount 1.0sec between time amount 1.5sec(s) between \*\* / 3 wave phase control A operation, and time amount 0.5sec at the time of heater drive initiation.

[0071] \*\* While carrying out control of \*\* and \*\*, the subheater H2 and the

bottom heater H1 forbid ON, when off.

[0072] Subheater H2: At the time of heater drive initiation, carry out [B] zero cross drive control C between [A] 1 / 3 wave phase control A, and 1.5sec between time amount 1.5sec(s), and carry out [C] zero cross drive control C between time amount 3.3sec(s). While carrying out [A] and [B] control, the Maine heater H2 and the bottom heater H1 forbid ON, when off.

[0073] Bottom heater H1: At the time of heater drive initiation, carry out [E] zero cross drive control C between 1.5sec(s) between [D] 1 / 3 wave phase control A operation, and 1.5sec, and carry out [F] zero cross drive control C between time amount 3.3sec(s). While carrying out [D] and [E] control, the Maine heater H2 and the subheater H2 forbid ON, when off.

[0074] At the time of phase control implementation, only phase control is carried out by \*\*1 / 3 wave phase control, and, in ON of a heater, it becomes an improvement of the rush current at 90 degrees or less of conduction angles, but a higher harmonic is affected. In ON [ a conduction angle ] of a heater at 90 degrees or more less than 180 degrees, a higher harmonic is not affected, but an improvement of the rush current also decreases.

[0075] Then, in order to lessen and to improve the rush current, effect on a higher harmonic is used as 72 degrees (90 degrees or less) of conduction angles, and carries out 1 / 3 wave phase control combined with 1 / 3 wave drives.

[0076] \*\* When \*\* zero cross drive control or full wave phase control (less than 180 degrees of 90-degree or more conduction angles) is carried out after \*\*1 / 3 wave phase control by full wave phase control (72 degrees of conduction angles), since the temperature of a heater is low, the rush current is large. \*\* Even if it extends the time amount of 1 / 3 wave phase control, since the temperature of a heater is saturated, the rush current is not suppressed.

[0077] Then, the rush current is suppressed by carrying out full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles). However, since the full wave phase control of 90 degrees or less of conduction angles affects a higher harmonic, 0.5 or more secs are inextensible.

[0078] \*\* By carrying out full wave phase control of 144 degrees of conduction angles (less than 180 degrees of 90-degree or more conduction angles) by full wave phase control (144 degrees of conduction angles) after the full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles), and carrying out zero cross drive control, the rush current can be suppressed rather than it carries out zero cross drive control after the full wave phase control of 72 degrees of conduction angles.

[0079] Next, as a cure of the flicker specification in CE specification (EN 61000-33), phase control was carried out and the Plt value estimated.

[0080]

Plt value (long duration flicker value): -- 0.65 or less value-of-standard Pst value (short-time flicker value): -- a 1.00 or less value-of-standard Plt value takes Pst under idling for 12 times = 2 hours, and carries out a cube average.

[0081] A Plt value is the measured value computed from the voltage variation by the rush current, and a measurement result is measured automatically with the flicker measuring instrument of drawing 9.

[0082] Flicker measurement is equipped with the automatic gain control circuit AGC, and it doubles the actual value  $V_{rms}$  of input voltage with reference voltage (the present instrument test voltage), without affecting "delta V/V." It has the response time for 60 seconds (time amount which changes to 10-90% of the range of fluctuation) to stair-like fluctuation of the actual value  $V_{rms}$  of input voltage. Before automatic gain control circuit AGC / back can be chosen as the value of the actual value  $V_{rms}$  which a flicker measuring instrument outputs. When a front is chosen, the true RMS of input voltage can be measured.

[0083] A flicker is saying the unstable feeling of the vision to which the brightness or spectrum distribution of a luminescence object is caused in order to change with time amount, for example, lighting's flickering, and feeling unpleasant etc. When this occurs by fluctuation of the supply voltage of lighting, it is flicker meter, and in addition, having been designed so that this voltage variation could be measured on the basis of people's general feeling is based on the flicker with the lamp (60W-230V) of a coiled form filament, and it is.

[0084] The short flicker value Pst calls the value (flicker severe RITI) which shows people's sensitivity over a flicker measured for a short period of time (IEC standards prescribe for 10 minutes) the short flicker value Pst. Pst=1 is the general value of sensitivity and makes this value a limit value in IEC standards.

[0085] A flicker value Plt is computed for a long period of time using the measured Pst value which carried out long duration (Pst measurement is specified as 12 time =2 hour by IEC standards) continuation. This is the value (flicker severe RITI) which shows the sensitivity over people's flicker, and calls it a flicker value Plt for a long period of time. Application of a limit value is exempted from the device for 30 or less minutes to 1 time of a usual time (except for the device to which it is IEC standards and having examined especially was directed).

[0086] Flicker meter is equipped with the filter which carries out weighting to voltage variation according to the property of the vision of the lamp made into the criteria of a flicker, and a man. The output of this filter is weighting electrical-potential-difference change "W-delta V/V", and is required of IEC

standards as an output of flicker meter.

[0087] Instant flicker value  $S(t)$  is the unit which made people's average consciousness sensibility the scale, and is setting to 1 (P. U.) the minimum value in which what people sense is possible. Unit P.U. is Perceptibility. It is the abbreviation for Unit (consciousness unit).

[0088]  $\text{root}S(t)$  is the extraction of the square root of  $S(t)$ , and outputs the value proportional to  $\Delta V/V$ . A unit is R.U.  $\text{root}S(t)$  is the 1 minute integral value of  $S(t)$ , and a unit is P.U.

[0089] the accumulation probability music into which the accumulation probability  $Pis$  ( $P0.1$ ,  $P1s$ ,  $P3s$ ,  $P10s$ ,  $P50s$ ) classified 1024 classes instant flicker value  $S(t)$  — it is used in order to ask and to calculate the short flicker value  $Pst$ , since green.

[0090] Flicker  $Pst$  measurement mode is shown below.

[0091] Actuation: It is adaptation] to the evaluation approach (short flicker severe RITI evaluation of flicker direct measurement) of [IEC 1000-3-3,868,868-0.

measuring-time: — renewal rate of the selection display from for [ between / 1 part / - ] 15 minutes (1 part spacing): — measured value — about 1 times (a fluctuation graph is a real-time display)/second

Measurement result: \*\* fluctuation graph [the fluctuation graph (a part for for a maximum of 15 minutes) of a basic parameter (except for integral  $S(t)$ ), a  $Pst$  value, and a judgment result]

\*\* The maximum, minimum value and average, accumulation probability  $P0.1$ ,  $P1s$ ,  $P3s$ ,  $P10s$ ,  $P50s$ , and  $Pst$  value and judgment result operation expression of a measured-value [basic parameter (integrals [  $\text{root}S(t)$  and ] ( $t$ ) remove) :  $Pst = \text{root} (K1P0.1 + K2P1 S + K3P3 S + K4P10 S + K5P50S)$

However,  $K1=0.0314$ ,  $K2=0.0525$ ,  $K3=0.0657$ ,  $K4=0.28$ , and  $K5=0.08$

accumulation stochastic function (CPF) classification 1024 class each accumulation probability ( $Pi$ ) are searched for by the linear interpolation method. Furthermore, the accumulation probability ( $Pis$ ) graduated by the following approaches Calculation  $P1S = (P0.7 + P1 + P105)/3$ ,  $P3S = (P2.2 + P33 + P4)/3$   $P10S =$  It is adaptation] to  $(P6 + P8 + P10 + P13 + P17)/5$  and the evaluation approach (prolonged flicker severe RITI evaluation of flicker direct measurement) of  $p50s = (P30 + P50 + P80)/3$  flicker  $Plt$  measurement mode actuation:[IEC] 000-3-3-868,868-0.

From N:two - 1008  $Pst$  measurement counts to the renewal rate of a selection display: Measured value is about 1 times (a fluctuation graph is a real-time display)/second.

Measurement result: \*\* fluctuation graph [the fluctuation graph of a  $Pst$  value, a  $Plt$  value, and a judgment result]

\*\* Measured value [the maximum and the minimum value of a basic parameter (integrals [  $\text{root}S(t)$  and ] ( $t$ ) remove), a  $Plt$  value, and a judgment

result]

\*\* It is  $P0.1$ ,  $P1S$ ,  $P3S$ ,  $P10S$ ,  $P50S$ ,  $Pst$  value, and judgment result] by the  $Pst$  list [measurement count.

Operation expression— $It = \text{root}[(\sigma(Psti) / N)]$

However, a 1-/N wave control measurement result when N uses one heater of fixing of measurement count 850W is shown in Table 1.

[0092] Table 1 [0093]

	条件	Plt 値
①	ゼロクロス駆動制御	1.364
②	1/2波	0.899
③	1/3波	0.78
④	1/4波	0.899
⑤	2/4波	1.108

[0094] From the above result, 1 / 3 wave phase control A driven once to 3 times are carried out at the time of heater drive initiation.

[0095] The  $Plt$  measurement result at the time of carrying out drive control of a heater at the heater of fixing of 1380W in order of 1 / 3 wave phase control A, the full wave phase control (90 degrees or less of conduction angles) B1, full wave phase control (less than 180 degrees of conduction angles) B-2, and the zero cross control C is shown.

[0096]

\*\* In the case [ :P ] only of zero cross control When the  $It$  value 2.161\*\* above-mentioned control is carried out  $It$  depends  $It$  value 0.62, the  $Plt$  value (0.65 or less) which is flicker specification by carrying out the above-mentioned control can be cleared, and it is control effective in flicker correspondence. :P

[Translation done.]

## \* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[Drawing 2] It is the sectional view showing an anchorage device.

[Drawing 3] It is the outline block diagram of a heater driving gear.

[Drawing 4] It is drawing explaining 1 / 3 wave phase control A.

[Drawing 5] It is drawing explaining the full wave phase control B1.

[Drawing 6] It is drawing explaining full wave phase control B-2.

[Drawing 7] It is drawing explaining the zero cross drive control C.

[Drawing 8] It is drawing explaining the example of control of a heater control section.

[Drawing 9] It is the block diagram showing a flicker measuring instrument.

### [Description of Notations]

62 Control Section

620 Temperature Control Section

621 Heater Control Section

622, 623 Heater mechanical component

S1 Pressurization roller temperature detection means

S2 Fixing roller temperature detection means

A 1 / 3 wave phase control

B1 Full wave phase control

B-2 Full wave phase control

C Zero cross drive control

H1 Heater of the pressurization roller 200

H2 Heater of a fixing roller 100

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[Translation done.]